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IMPLEMENTING A CURRENT RESEARCH INFORMATION SYSTEM (CRIS) IN CANADA

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Abstract

The practice of research information management (RIM) is becoming more important as the research environment becomes increasingly complex, competitive and globalized. National mandates and requirements of national funding agencies regarding open access and research data management are creating added incentives for universities to showcase their publications and make them available in an open access format. Libraries are well situated to offer expertise throughout the adoption of a research information management system by a university. In aligning themselves with the wider strategic plans of the institution, libraries can use this as a platform to further their own goals and communicate their value and place in the institution by championing open access, ensuring discoverability and supporting the researcher endeavour.

Dalhousie University is in the process of implementing a Research Information System (RIS) with the goal of providing a number of benefits to the university and its researchers. RIS serve to aid researchers when applying to funding agencies by creating consistent, standardized CVs, decrease workload when generating annual reports, increase the visibility and discoverability of an institution to potential collaborators and research contacts, augment the research currently being performed at an institution and make it more widely available, and manage and measure the research impact of individual researchers and institutions. While some challenges exist at Dalhousie that require mitigation and attention, the institution stands to benefit greatly from the implementation of this system.

Introduction

The practice of research information management (RIM) is becoming more important as the research environment becomes increasingly complex, competitive and globalized. At the same time, universities are looking for ways to identify strengths, demonstrate engagement, and measure the impact of their research and educational programming. (Bryant et al., 2017, p. 10). National mandates and requirements of national funding agencies regarding open access and research data management are creating added incentives for universities to showcase their publications and make them available in an open access format.

Libraries are well situated to offer expertise throughout the adoption of a research information management system by a university. In aligning themselves with the wider strategic plans of the institution, libraries can use this as a platform to further their own goals and communicate their value and place in the institution by championing open access, ensuring discoverability and supporting researchers.

In Europe, the implementation of Current Research Information Systems (CRIS) began more than a decade ago (Bevan & Harrington, 2011; Jefferey & Asserson, 2008; Joint, 2008; Scholze & Mayer, 2012), for instance with the national adoption of Pure in Denmark, adoption in Austria at several universities including the University of Vienna, Montanuniversität Leoben and Graz University of Technology (Greil, 2015) and with the University of St. Andrews in Scotland choosing to replace their in-house CRIS with Pure (Clements & McCutcheon, 2014, p. 201). Atira, from which Pure developed, was created in Denmark in 2002 in Aalborg (Jorgensen, 2016) and there was significant government support behind the mandatory adoption of Pure at Danish universities. Since then, Danish librarians have deftly used the system to extract strategic research metrics and analyze trends (Price, 2008; Wien et al., 2016). euroCRIS, also founded in 2002, has helped European institutions to implement effective CRIS platforms and standards. The euroCRIS mandate is: "to promote cooperation within and share knowledge among the research information community and interoperability of research information through CERIF, the Common European Research Information Format. Areas of interest also cover research databases, CRIS related data like scientific datasets, (open access) institutional repositories, as well as data access and exchange mechanisms, standards and guidelines and best practice for CRIS" ("What is euroCRIS", n.d.).

In Canada, CRIS implementation began only recently and is not coordinated nationally or regionally. Universities are evaluating products such as Elsevier's Pure, Clarivate's Converis, Symplectic

Elements, Ex Libris Esploro, D-Space CRIS, and UNIWeb, a Canadian product, and ultimately selecting the approach that best meets their criteria. A recent OCLC survey has indicated that implementing a CRIS is one of the top five priorities for University Librarians and Deans of libraries in Canada (Lewis & Proffitt, 2019).

Through an initiative led by the University Librarian, Dalhousie University has joined other Canadian universities, including McGill, University of Ottawa, Queen's University, and the University of Lethbridge, as subscribers to UNIWeb, a Research Information System (RIS) with functionality that is particularly conducive to the Canadian research environment. In addition to a robust CV capability that allows each member to record all their academic activity reflecting research activity, publications, course load, the graduate students that they supervise, and community service contributions, UNIWeb is fully compatible with the Canadian Common CV (CCV) and supports data updates in both directions. This feature saves researchers time by eliminating the need to update an annual report or CV and Canadian Common CV separately.

Additionally, UNIWeb members can create web-based public profiles over which they have full control regarding fields display on the open web. Researcher profiles include user-selected research interests and tags that enable the discovery of potential research partners across Dalhousie University and around the world. They also assist graduate students when seeking a supervisor or a research team.

Throughout the implementation of UNIWeb at Dalhousie University, there have been several benefits and constraints that have highlighted the need for the development of best practices and recommendations in order to ensure a successful implementation of a CRIS at an academic institution.

Literature Review

As the value of systems for documenting research activity began to gain attention, and technical solutions were reaching maturity, universities began to turn their attention to implementing CRIS (Bevan & Harrington, 2011; Jeffery & Asserson, 2008). The literature about CRIS includes articulations of their potential value, accounts of local implementations, and discussions about metadata and research evaluation.

Several authors describe the value of a CRIS for user groups including researchers, administrators, funding agencies, innovators and media (Bevan & Harrington, 2011; Buchmayer et al., 2014; Grenz et al., 2017; Jeffery & Asserson, 2008; Scholze & Maier, 2012). CRIS can facilitate the review of previous research (Grenz, 2017; Jeffery & Asserson, 2008); document the research performance of individuals and institutions (Akoef et al., 2016; Bevan & Harrington, 2011; Jeffery & Asserson, 2008); support administrative functions such as annual reports and researcher profiles (Bevan & Harrington, 2011; Scholze & Maier, 2012); integrate workflows in areas such as Article Processing Charges (APCs) (Clarke & Bussey, 2018, p.218); facilitate the preservation of research outputs and data (Clarke & Bussey, 2018; Schopf et al., 2017; Simons et al., 2017) provide access to material for teaching and learning (Jeffery & Asserson, 2008, p. 73), and enable the public and media to have easier access to quality information to popularize research (Buchmayer et al.; Jeffery & Asserson, 2008). Dorch (2015) points out that the Pure system at the University of Southern Denmark and in other Danish institutions works in conjunction with the Danish Open Access strategy to enable scholarly communication and research evaluation (n.p.).

Accounts of CRIS implementation provide descriptions of best practices and challenges experienced during the process. In their implementation of Pure at the University of Vienna, Buchmayer et al. (2014) found that participation by stakeholders at an early stage is important, as is the composition of the implementation team. The University of Vienna also holds annual meetings for "power-users" and representatives from faculties (Greil, 2015, n.p.). McGrath and Cox (2014) note that during the implementation of Pure at King's College London, regular presentations were made at departmental meetings, to create a better level of awareness than launch events (p. 303). The team also conducted semi-structured interviews with stakeholders across the institution (p. 303). At the University of St

Andrews, the team mapped workflows against research lifecycles and established a connection between Open Access and CRIS processes (Fina & Proven, 2017, p. 237).

Challenges reported by institutions included increased workload (Bevan & Harrington, 2011; Buchmayer et al., 2014), the need to develop new skills, the engagement of stakeholders (Bevan & Harrington, 2011, p. 29), difficulties in ingesting information into the system (Grenz et al., 2017, p. 178), and creating a comprehensive research information management environment (Grenz et al., 2017, p. 180). Jeffery and Asserson (2008) articulate the advantages of formal metadata, and identify issues regarding interoperability of metadata in CRIS (p. 79). Bevan and Harrington (2011) note the trade-off between data quality in the CRIS and workload for those entering and validating it (p. 28). Akoev et al. (2017) found limitations in the ability to evaluate some stages of research activity (p. 50).

What is a Current Research Information System (CRIS)?

A CRIS or a Research Information System (RIS) captures information about the current research activities of a university, aggregating, curating, managing and utilizing information and metadata to provide a view of research output and impact for the institution (Bryant et al., 2017, p. 7). RIS enable institutions to manage this information in combination with other valuable data such as researchers' affiliations, publications, research data, funding applications and reviews, budgets, academic service and honours, and impact measures (Bryant et al., 2017; Science Europe, 2016). Institutions may also include internal measures of scholarly activity such as courses, graduate student supervision and committee contributions (Bryant et al., 2017, p. 6). Science Europe distinguishes research information management (RIM) from research data management, noting that RIM deals with "data about research activities rather than research data generated by researchers" (Science Europe, 2016, p. 3).

Varying terminology is used to denote RIS. The term Current Research Information System (CRIS) tends to be used in Europe, with the initial C sometimes being dropped. In North America, the terms used vary more widely, and systems may be known as Research Networking Systems (RNS), Research Profiling Systems (RPS) or Faculty Activity Reporting (FAR) (Bryant et al., 2017, p. 7). In Europe, euroCRIS, a not-for-profit association that includes research administration experts, emerged as a leader in developing standards and practices for RIM, and maintains the Common European Research Information Format (CERIF) standard (Science Europe, 2016, p. 7). Science Europe (2016) has proposed a set of common principles for RIS to enhance interoperability. Canada currently lacks similar standards nationally, although a draft research classification standard tentatively titled the Canadian Research and Development Classification 2019, covering type of activity, fields of research and socio-economic objectives, is currently being developed (Canada Research Coordinating Committee, 2019).

Why Implement a Current Research Information System?

In an intensive research landscape that is highly competitive locally as well as globally, where quality data are crucial for strategic decision-making, planning, impact measurement and benchmarking, a CRIS can provide many advantages.

CRIS can help to tell the story of a university, providing insight into the research landscape: the funding that has been secured; the expertise of researchers; the collaborations that are taking place within and beyond the institution, nationally and globally; the impact of the research and related publications; and effects on the university's scholarly reputation. Joint (2008) points out that in a climate of evaluation, a universities' research needs to be as visible as possible (p. 574). A CRIS can also help track the scholarly and community activities of academic staff to aid in career development, tenure and evaluation processes.

For the university, and particularly the research and analytics office, a CRIS facilitates a robust and granular analysis of research activity and the identification of research trends. Administratively, a CRIS can streamline workflow and eliminate multiple internal forms and data collection procedures. It also can lead to the engagement of networks of researchers with similar interests, and the identification of research themes across the institution.

Researcher profile management, often with interoperability with CV systems and faculty evaluation processes, facilitates robust recording of faculty research and publication activities. Researcher profiles can also be used as public-facing faculty expertise directories (Bryant et al., 2017, p. 9). Faculty activity recording, including collecting and managing information related to scholarly activities such as teaching, graduate student supervision, tenure and evaluation processes, or institutional service, can be used for faculty evaluation and promotion purposes.

Grants and funding application management can be facilitated via the RIS to ensure greater compliance with granting agency requirements and accountability for the allocation and spending of funds. Research ethics applications and approvals can be tracked and streamlined through some systems.

Data and metadata related to research activities are aggregated within the system and can be used in reporting, decision-making, planning and accreditation for departments and the institution. Research impact can also be measured via connections with external sources such as Scopus.

The CRIS can be integrated into the workflow of an institutional repository, encouraging the deposit of research output and reducing workflow related to metadata. In Canada this helps to fulfill the Tri-Council requirements for publications to be made available via open access. Incorporating the CRIS with the institutional repository strengthens the continuum between research data creation, management and long-term preservation.

Perhaps most importantly for the university, a CRIS can be the source of rich data and metrics to demonstrate the extent, depth and impact of a university's expertise, success at attracting funds, level of innovation, and research impact.

For researchers, CRIS can represent a way of streamlining and enhancing their research process and presence, and making their work more visible. Developing a profile with professional activities and accomplishments that is compatible with the Canadian Common CV system can save time. This was identified as a desirable feature for researchers (Korberg, 2016, p. 22). Researchers can generate information to use in professional profiles and annual reports, and can develop research networks and identify potential research partners. Having all of the processes, information and activities related to a research project together in one place can lighten the workload of faculty. However, Korberg (2016) found that a lack of faculty engagement due to time constraints and administrative burden was one of the anticipated barriers to a proposed RIS (p. 26).

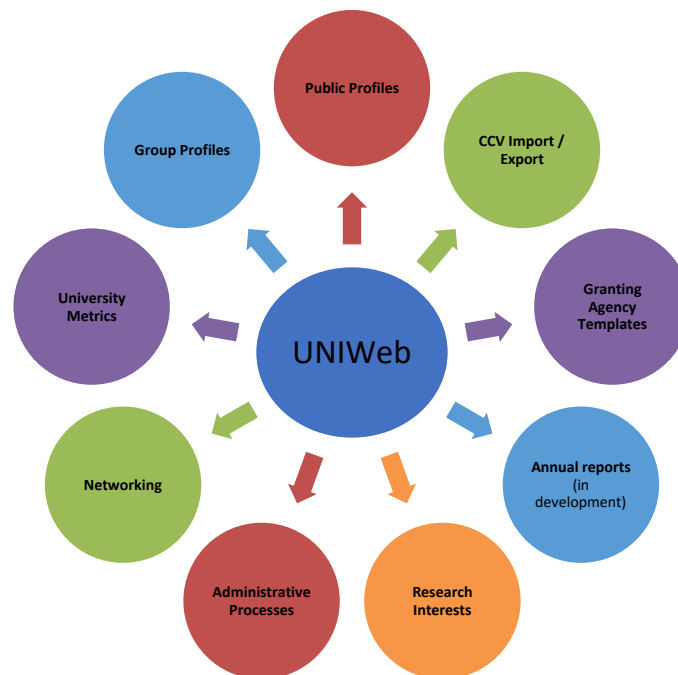
For libraries, providing leadership in the implementation of a CRIS can demonstrate the library's value to the institution, and can leverage existing relationships and expertise to support the research life cycle and institutional strategic goals. Involvement in administering a CRIS for the institution places a library in a good position to advance open access, discoverability and to grow relationships with researchers and faculties. Managing enterprise-wide systems is becoming increasingly the norm for research libraries, including records management systems and programs, Learning Management Systems, Research Data Repositories, and various publishing systems. All of these systems work most effectively when operated in a coordinated manner, by a unit that values service excellence, user empowerment through instruction, responsive user support, the development of rigorous and helpful documentation, and adherence to international standards.

Implementing and administering a CRIS can be compared to earlier implementation and administration of an Integrated Library System (ILS), in the sense that both systems manage knowledge assets; an ILS organizes and allows for the discovery of published information, while a CRIS provides an organized way to discover information about university researchers and their current work. The comparison is useful to a point, though of course monographs and journals do not volunteer or need to consent to be added to an ILS, unlike faculty members who understandably want to see value in their participation in a CRIS before investing their time and data.

A CRIS can provide strategic information to the library that informs key decisions: Using a model similar to that used by the University of California, McMaster University Libraries was able to use CRIS data, combined with data from UnPaywall, to estimate the cost of paying gold OA charges for all articles written by campus authors during a designated period of time. That analysis confirmed the UC findings – that library subscription costs fail to cover the full cost of APCs for research-intensive universities.

Bryant et al. (2017) identify several ways that libraries can use their expertise to support RIM through an RIS. Librarians have expertise in publishing and scholarly communication, managing information, optimizing data quality and aggregating resources. They are also knowledgeable about publishing, discovery, licensing and copyright trends, as well as about dealing with metadata and unique identifiers (p. 13). Librarians can use RIM information to support knowledge sharing within the institution and beyond, through enhancing portals for institutional expertise and promoting open access to locally produced scholarly content. Traditional and alternative research impact metrics are also areas where librarians have already developed skills to support institutional needs (p. 14). Most libraries actively offer training opportunities for researchers, and have the infrastructure to take on the critical training of researchers in the use of the CRIS and research data management (RDM) policy compliance (p. 15). Korbort (2016) indicates that training should be strategic and linked to something that researchers perceive as being of high value (p. 28). Support of researchers in setting up profiles and entering information may also be a library role. Stewardship of the scholarly record has long been the responsibility of libraries, and stewardship of the institutional record is an extension of that role, involving the library's skills in increasing discoverability, preserving the record and integrating RIM data into other systems (Bryant et al., 2017, p. 15-16).

What is UNIWeb?



UNIWeb is a web-based researcher networking and information management tool developed by a Canadian company, Proximify. UNIWeb operates as a central data repository for researchers to upload their curriculum vitae information, and also has a public side that profiles activities and facilitates connection and collaboration with other researchers across the institution. UNIWeb was originally created by a post-doctoral fellow, Diego Macrini, as a collaboration tool to be used by the medical faculty at the University of Ottawa (Korberg, 2016, p. 14). It then developed further to be used as a tool for completing the Canadian Common CV which is an essential tool for grant applications in the Canadian research

environment. Creating custom reports is an added bonus that allows for a range of applications of the data.

UNIWeb allows administrators to quickly access researcher information that gives insight into the research that is being conducted at the faculty or institution level. This easy access aids universities in generating measurable outputs about their institution's research performance (Rousseau et al., n.d., p. 2).

UNIWeb is appealing to institutions because it promises a high level of customization with regard to the creation of individualized annual reports for different faculties, and the ability to modify data collection fields or add entire sections in the curriculum vitae, while still offering full compatibility with the Canadian Commons CV.

Canadian CRIS Installs

There are currently nine universities, research associations and centres using UNIWeb in Canada. Other institutions have implemented CRIS products from other vendors such as Experts, powered by VIVO, and Pure from Elsevier. There is considerable variation in the extent to which the library is involved with the management of these products, in some cases serving as the administrators, and in some cases participating as part of a multi-unit team, or not participating at all.

Reasons some universities mentioned for selecting UNIWeb included its customizability and its adaptability to suit the academic mission and commitment to excellence in research (Rousseau et al., n.d., p. 1). Some institutions have chosen to create institution-specific templates for the Canadian Common CV and annual report templates for each academic unit. Dalhousie University is currently in the process of creating mapping structures for annual reports for their faculties in order to benefit from this customization.

Many institutions have also created a secure single-sign-on system, allowing users to access the new system using their institutional log in (Rousseau et al., n.d., p. 3), something that Dalhousie University has also adopted.

UBC Okanagan is currently working to integrate their own online mapping software, Mapping Okanagan Research Engagement, developed in-house, and PlumX by Plum Analytics with UNIWeb's functionality (Rousseau et al., n.d., p. 3). University of Ottawa have implemented a bilingual version of UNIWeb to create a seamless experience for their users that works within University of Ottawa's mandate to maintain a fully bilingual system. (Rousseau, n.d., p. 2). University of Ottawa has also opted for an institution wide uOttawaCV that serves as their single document used for annual reports, applications for tenure and sabbatical. This document is standard across all departments and faculty which saved time in the customization and creation stage (Rousseau, n.d., p. 3).

Implementation at Dalhousie

Discussions regarding the need for software that enables faculty to create web-based researcher profiles, consistent CVs that link with faculty members' Canadian Common CV, annual reports and other documentation reflecting research activity throughout the university, have been taking place at Dalhousie since 2010. Various vendors met with Deans, Associate Deans Research and other faculty members in 2014 to present demos of products. In 2017, the Deans' Council and the Dalhousie Research Advisory Committee recommended procuring a faculty reporting tool and began the Request for Proposal process, managed by Dalhousie Libraries. A selection committee was formed that consisted of Deans, Associate Deans Research and administrative staff in Faculties, and the Office of the Vice-President of Research and Innovation. Two companies responded to the Request for Proposal and Dalhousie chose UNIWeb based on functionality, integration with the Canadian Common CV, secure data storage on Canadian servers, unlimited web-based training, and positive references from clients. Before this university-wide initiative, the faculties of Health and Computer Science at Dalhousie had been using UNIWeb for two years.

In November 2018, the initial agreement was signed with UNIWeb. The participating faculties each appointed one or more Faculty Administrator(s) to liaise with Dalhousie Libraries, who are providing systems support through the Academic Technology Services and Scholarly Communications units. Funding was approved by the Provost's Committee for the appointment of a UNIWeb Coordinator to work with each faculty to facilitate training, implementation and trouble-shooting requirements. The cost is shared by Deans, the Vice-President of Research and Innovation, the Provost and participating faculties.

The objectives of the UNIWeb implementation project plan are defined as:

- Successfully implement an instance of UNIWeb across Dalhousie campuses
- Gather input from faculties regarding necessary customizations for data collection and generation of CVs and Annual Reports
- Provide support for faculty in order to promote uptake
- Develop sections of UNIWeb to promote networking and discovery of research and researchers at Dalhousie University
- Work with stakeholders to maximize the use of UNIWeb as a metrics data tool
- Explore options for future integration with other systems

A major component of the work that Dalhousie Libraries has undertaken is the faculty coordination and planning for specific customizations for CVs and annual reports. In each instance the UNIWeb team of Dalhousie Libraries have gathered examples of the annual reports currently being used by the faculty and have mapped each section of the annual report to the specific schema fields in UNIWeb. This work has identified necessary changes to annual reporting practices across faculties and has highlighted some necessary changes that need to be made in UNIWeb's data collection fields. Dalhousie University benefitted somewhat from the previous work in this area that was done at other Canadian universities already using UNIWeb, such as University of British Columbia Okanagan and University of Ottawa, and it is hoped that future universities that adopt UNIWeb will benefit from the work Dalhousie is currently undertaking.

Further investigation is planned for integration possibilities with ORCID identifiers as well as our institutional repository, DalSpace. UNIWeb has recently added a field where a researcher can enter their ORCID; however, doing so does not yet auto-populate their publications from that ORCID record. Researchers appreciate the import and export capability between UNIWeb and the Canadian Common CV and the ability to import publication references from BibTeX Files, EndNote, and PubMed, but have expressed a strong desire to include ORCID in that list.

A number of constraints and risks have arisen during the early stages of implementation at Dalhousie University. The availability of knowledgeable staff to be able to promote and maximize the capabilities of everything the product has to offer has been one constraint that has been mitigated by hiring a dedicated UNIWeb coordinator. Even with additional dedicated staff there is a substantial learning curve with a complex system like a CRIS. The cost of customization is another constraint, and funding limitations present a risk in terms of what the institution is able to accomplish. Expectations among the university community sometimes do not match the capabilities of the system and time may be the ultimate constraint, as customization takes more time than expected. A major risk to the initiative is the failure of implementation due to a lack of uptake by researchers.

Privacy

UNIWeb's set up alleviates some privacy concerns because of the clear separation of private CV and public profile. Only the member and their administrators within the institution can see the full content of their CV. Each member determines what they wish to display in their public profile space and it is intuitive and easy to self-administer and edit the content presented. The personal information entered into the UNIWeb application is collected in accordance with the Freedom of Information and Protection of Privacy Act and with the Dalhousie Privacy Statement. Information entered into the application may be used by the University in connection with employment and for reporting and statistical purposes and may be used to derive aggregated academic metrics for Dalhousie University as well as for an academic unit within Dalhousie University.

Lessons Learned So Far

Through the early stages of an implementation of a CRIS at Dalhousie, several key lessons have emerged concerning the resources and efforts that optimally needed to be considered. These involve the configuration of the implementation team, the time commitment needed and the management of expectations throughout the university. The makeup of the implementation team requires a range of personnel; some at the senior levels of the university to inform and liaise with Deans across the campus, some with the technical skills to ensure the interoperability of the CRIS with local systems, and some who can become “on-site experts” offering support, advice and training to each faculty. This last group is especially key if the decision is made to offer customized reports to any faculty who requires them. It is necessary for this group to develop a project plan, liaise with the vendor for requested schema changes, liaise with faculties regarding custom report requirements and troubleshoot various issues that inevitably arise when integrating a complex system into an academic environment. It is also necessary to appoint liaisons or administrators in each faculty or department to provide a conduit for two way communication of needs, issues and progress as the implementation progresses through various stages.

Having a dedicated team for this work is essential and it is realistic to expect that this early work will take twelve months or more depending on the amount of customization planned. Each institution has its own unique configuration which may require changes in the data collected. An initial review of the data collection schema can be a time consuming step, but it services a larger purpose of building local knowledge of the capability of the system and informing any report designs planned. Designing reports is often the most time consuming task, requiring much consultation with the report users, review of existing practices, liaison with the vendor designers, and testing of output. It is a process that can take months and cannot be rushed.

Managing expectations can be one of the greatest challenges. Faculties are often not familiar with what a CRIS does and do not anticipate the amount of work that must be done locally. The implementation of an information system of any kind often requires that existing internal processes and information gathering practices be reviewed before there can be a successful transition to an automated system. Working remotely with an external vendor can slow the communication and implementation process as all things have to be relayed, checked and tested between the users, university and vendor. Managing time expectations early on in the process can avoid disappointment from faculty who expect the system to be up and running quickly or their custom reports to be ready within a few months of start up.

In anticipation of the implementation of any CRIS system best practices and recommendations from other institutions who have been through the process are invaluable for a realistic view of all that is involved.

Conclusion

While CRIS are being increasingly considered and adopted in Canada, practices and product choice vary widely across institutions in response to local needs. Many benefits exist when implementing a CRIS at an academic institution. These products serve to aid researchers when applying to specific funding agencies or grants by creating consistent, standardized, department-specific CVs, decrease workload when generating annual reports, increase the visibility and discoverability of an institution to potential collaborators and research contacts, augment the research currently being performed at an institution and make it more widely available, and manage and measure the research impact of individual researchers and institutions.

The adoption of UNIWeb at Dalhousie University is a new undertaking and while some challenges exist that require mitigation and attention, the institution stands to benefit greatly from the implementation of this unique and valuable research information system.

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